IN THE CLAIMS

1. (Currently Amended) A computer-implemented numerical-simulation method for rotary metal forming, which comprising:

divides dividing, into a plurality of finite elements, a predetermined model zone between two imaginary cutting planes intersecting with a circumferential direction in a rotary formed body rotated about an axis of rotation;

expresses setting velocity boundary conditions of said imaginary cutting planes for said predetermined model zone by a function where, wherein an angular velocity for rotation about said axis of rotation of said rotary formed body is made a variable and the velocity boundary conditions are set so as to model plastic deformation of said rotary formed body in the circumferential direction; and

analyses analyzing, by a finite element method, a forming process which that continuously produces plastic deformation by localized contact with said rotary formed body.

2. (Currently Amended) [[A]] The numerical-simulation method for rotary metal forming according to claim 1, wherein in the a case where said axis of rotation is displaced with an addition of an increase in diameter of said rotary formed body in said forming process, said velocity boundary conditions are set equal to expressed by a function having three variables comprising; and increasing , including (1) a rate of increase of the diameter of said rotary formed body, (2) said angular velocity for rotation about said axis of rotation of said rotary formed body, and (3) a correction value for traverse velocity of said axis of rotation.

3. (Currently Amended) [[A]] The numerical-simulation method for rotary metal forming according to claim 1, wherein said velocity boundary conditions are expressed by a

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~~function having other variables capable of conversion into said variables~~ <u>set in terms of a rate</u> <u>of increase of an angular extent of the model zone</u>.

4. (Currently Amended) [[A]] <u>The</u> numerical-simulation method for ~~rolling~~ <u>rotary</u> metal forming according to claim 1 ~~wherein,~~ <u>further comprising:</u>

[[a]] <u>applying an</u> Euler method where<u>in</u> said finite elements are spatially fixed ~~is~~ ~~applied~~ with respect to the rotation direction of said rotary <u>formed</u> body~~, and;~~ <u>and</u>

<u>applying</u> a Lagrange method where<u>in</u> said finite elements are movable with said rotary formed body ~~is applied~~ with respect to a direction along said axis of rotation of said rotary <u>formed</u> body and the radial direction of said rotary <u>formed</u> body.

5. (Currently Amended) [[A] <u>The</u> numerical-simulation method for rotary metal forming according to claim 1, ~~involving;~~ <u>comprising one of:</u>

dividing a non-model zone outside of said model zone of said rotary <u>formed</u> body by elements for data storage, and of said two imaginary cutting planes, sequentially storing data related to said velocity boundary conditions output from one of said imaginary cutting planes in said elements <u>for data storage,</u> and inputting from an other of said imaginary cutting planes~~, or;~~ <u>and</u>

computing said data for said non-model zone using interpolation related to the angle about said axis of rotation, based on said data at said one of said imaginary cutting planes and said data at said other of said imaginary cutting planes, and inputting from said other of said imaginary cutting planes.

6. (Currently Amended) A recording medium recorded with[[,]] a <u>computer</u> program for making a computer function as a fixed axis of rotation time conversion section ~~which~~[[,]] <u>by performing the steps of</u>:

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~~divides~~ dividing, into a plurality of finite elements, a predetermined model zone between two imaginary cutting planes intersecting with a circumferential direction in a rotary formed body rotated about an axis of rotation; ~~and~~

~~expresses~~ setting velocity boundary conditions of said imaginary cutting planes for said predetermined model zone by a function, ~~where~~ wherein an angular velocity for rotation about said axis of rotation of said rotary formed body is ~~made a~~ variable and the velocity boundary conditions are set so as to model plastic deformation of said rotary formed body in the circumferential direction; and

~~and a program for making said computer function as an~~ analyzing, ~~section which analyses~~ by a finite element method, a forming process ~~which~~ that continuously produces plastic deformation by localized contact with said ~~Rotary~~ rotary formed body.

7. (Currently Amended) A recording medium according to claim 6, ~~recorded with~~ further comprising a program for making said computer function as a boundary condition conversion section for, in ~~the~~ a case where said axis of rotation is displaced with an addition of an increase in diameter of said rotary formed body in said forming process, ~~expressing~~ setting said velocity boundary conditions ~~by~~ equal to a function having three variables ~~comprising; an increasing~~ , including (1) a rate of increase of the diameter of said rotary formed body, (2) said angular velocity for rotation about said axis of rotation of said rotary formed body, and (3) a correction value for traverse velocity of said axis of rotation.

8. (Currently Amended) A recording medium according to claim 6, recorded with a program for making said computer function as a variable conversion section for ~~expressing~~ setting said velocity boundary conditions ~~by a function having other variables capable of conversion into said variables~~ in terms of a rate of increase of an angular extent of the model zone.

9. (Currently Amended) A recording medium according to claim 6, ~~recorded with~~ further comprising a program for making said computer function as an integrating section ~~which applies a~~ by performing the steps of:

applying an Euler method wherein said finite elements are spatially fixed[[,]] with respect to the rotation direction of said rotary formed body[[,]]; and

~~applies~~ applying a Lagrange method wherein said finite elements are movable with said rotary formed body, with respect to a direction along said axis of rotation of said rotary formed body and the radial direction of said rotary formed body.

10. (Currently Amended) A recording medium according to claim 6, ~~recorded with~~ comprising a program for making said computer function as a data setting section ~~for~~ by performing one of:

dividing a non-model zone outside of said model zone of said rotary formed body by elements for data storage, and of said two imaginary cutting planes, sequentially storing data related to said velocity boundary conditions output from one of said imaginary cutting planes in said elements for data storage, and inputting from an other of said imaginary cutting planes[[,]]; ~~or~~ and

computing said data for said non-model zone using interpolation related to the angle about said axis of rotation, based on said data at said one of said imaginary cutting planes and said data at said other of said imaginary cutting planes, and inputting from said other of said imaginary cutting planes.

11-15. (Canceled).

16. (New) A system for numerical-simulation of rotary metal forming, comprising:

a mechanism configured to divide, into a plurality of finite elements, a predetermined model zone between two imaginary cutting planes intersecting with a circumferential direction in a rotary formed body rotated about an axis of rotation;

a mechanism configured to set velocity boundary conditions of said imaginary cutting planes for said predetermined model zone by a function, wherein an angular velocity for rotation about said axis of rotation of said rotary formed body is variable and the velocity boundary conditions are set so as to model plastic deformation of said rotary formed body in the circumferential direction; and

a mechanism configured to analyze, by a finite element method, a forming process that continuously produces plastic deformation by localized contact with said rotary formed body.

17. (New) The system of claim 16, wherein in a case where said axis of rotation is displaced with an addition of an increase in diameter of said rotary formed body in said forming process, said mechanism configured to set is configured to set said velocity boundary conditions equal to a function having three variables, including (1) a rate of increase of the diameter of said rotary formed body, (2) said angular velocity for rotation about said axis of rotation of said rotary formed body, and (3) a correction value for traverse velocity of said axis of rotation.

18. (New) The numerical-simulation method for rotary metal forming according to claim 2, wherein said velocity boundary conditions are set in terms of a rate of increase of an angular extent of the model zone.

19. (New) The numerical-simulation method for rotary metal forming according to claim 2, further comprising:

applying an Euler method wherein said finite elements are spatially fixed with respect to the rotation direction of said rotary formed body; and

applying a Lagrange method wherein said finite elements are movable with said rotary formed body with respect to a direction along said axis of rotation of said rotary formed body and the radial direction of said rotary formed body.

20. (New) The numerical-simulation method for rotary metal forming according to claim 2, comprising one of:

dividing a non-model zone outside of said model zone of said rotary formed body by elements for data storage, and of said two imaginary cutting planes, sequentially storing data related to said velocity boundary conditions output from one of said imaginary cutting planes in said elements for data storage, and inputting from an other of said imaginary cutting planes; and

computing said data for said non-model zone using interpolation related to the angle about said axis of rotation, based on said data at said one of said imaginary cutting planes and said data at said other of said imaginary cutting planes, and inputting from said other of said imaginary cutting planes.

21. (New) The numerical-simulation method for rotary metal forming according to claim 4, comprising one of:

dividing a non-model zone outside of said model zone of said rotary formed body by elements for data storage, and of said two imaginary cutting planes, sequentially storing data related to said velocity boundary conditions output from one of said imaginary cutting planes in said elements for data storage, and inputting from an other of said imaginary cutting planes; and

computing said data for said non-model zone using interpolation related to the angle about said axis of rotation, based on said data at said one of said imaginary cutting planes and said data at said other of said imaginary cutting planes, and inputting from said other of said imaginary cutting planes.

22. (New) A recording medium according to claim 7, recorded with a program for making said computer function as a variable conversion section for setting said velocity boundary conditions in terms of a rate of increase of an angular extent of the model zone.

23. (New) A recording medium according to claim 7, further comprising a program for making said computer function as an integrating section by performing the steps of:

applying an Euler method wherein said finite elements are spatially fixed with respect to the rotation direction of said rotary formed body; and

applying a Lagrange method wherein said finite elements are movable with said rotary formed body, with respect to a direction along said axis of rotation of said rotary formed body and the radial direction of said rotary formed body.

24. (New) A recording medium according to claim 7, comprising a program for making said computer function as a data setting section by performing one of:

dividing a non-model zone outside of said model zone of said rotary formed body by elements for data storage, and of said two imaginary cutting planes, sequentially storing data related to said velocity boundary conditions output from one of said imaginary cutting planes in said elements for data storage, and inputting from an other of said imaginary cutting planes; and

computing said data for said non-model zone using interpolation related to the angle about said axis of rotation, based on said data at said one of said imaginary cutting planes and

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said data at said other of said imaginary cutting planes, and inputting from said other of said imaginary cutting planes.

25. (New) A recording medium according to claim 9, comprising a program for making said computer function as a data setting section by performing one of:

dividing a non-model zone outside of said model zone of said rotary formed body by elements for data storage, and of said two imaginary cutting planes, sequentially storing data related to said velocity boundary conditions output from one of said imaginary cutting planes in said elements for data storage, and inputting from an other of said imaginary cutting planes; and

computing said data for said non-model zone using interpolation related to the angle about said axis of rotation, based on said data at said one of said imaginary cutting planes and said data at said other of said imaginary cutting planes, and inputting from said other of said imaginary cutting planes.

26. (New) The numerical-simulation method for rotary metal forming according to claim 1, wherein the method is used for process design of a metal working process that reduces necessary computation time without degrading the accuracy of the numerical simulation,

the predetermined model zone is a subject of said numerical simulation,

said velocity boundary conditions are a velocity of nodal points on the imaginary cutting planes; and

the method further comprises outputting a calculation result of stress distribution of said rotary formed body.